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DR. T. E. HODGES, president of the University of West Virginia, has resigned to become a candidate for congressman-at-large.

PROFESSOR JAMES WILLIAM TOUMEY has been elected director of the Yale School of Forestry for five years, in place of Henry S. Graves. Professor Toumey has been acting director during Professor Graves's absence as United States forester.

PROFESSOR M. A. ROSANOFF, for the past seven years director of the department of chemistry in Clark University, has accepted a professorship of chemical research in the Mellon Institute of Industrial Research and the graduate school of the University of Pittsburgh. Dr. Rosanoff's students have resigned fellowships at Clark and have followed him to Pittsburgh.

DR. HOMER F. SWIFT has been appointed associate professor of the practise of medicine in the College of Physicians and Surgeons of Columbia University in succession to Dr. Theodore C. Janeway, now of the Johns Hopkins Medical School.

DR. ALWIN M. PAPPENHEIMER has been appointed professor of pathology in the College of Physicians and Surgeons, Columbia University, to succeed Dr. James W. Jobling, who has become professor of pathology in Vanderbilt University.

In the University of California Dr. Walter Lafayette Howard, since 1905 professor of horticulture in the University of Missouri, has been appointed associate professor of pomology. Dr. Jacob Traum, until recently of the staff of the division of pathology of the Bureau of Animal Industry of the United States Department of Agriculture, has been appointed assistant professor of veterinary science, and will devote his time to investigations in regard to tuberculosis in the domestic animals. Roland S. Vaile, until recently collaborator in the United States Bureau of Entomology, has been appointed assistant professor of orchard management. He will be attached to the Graduate School of Tropical Agriculture at Riverside.

At the Massachusetts Institute of Technology in the department of mechanical engineering, E. W. Brewster and Arthur F. Petts have been named assistants, and Henry M. Wylde, Robert T. Gookin and Walter Haynes, assistants in inorganic chemistry, food analysis and electrical engineering, respectively. Dr. Charles A. Kraus has resigned as assistant professor of physico-chemical research.

#### DISCUSSION AND CORRESPONDENCE

##### EVOLUTION BY SELECTION OF MUTATIONS

HUGO DE VRIES, in his Brussels address delivered last January and printed in *SCIENCE* of July 17, with an annotation by the author replying to a criticism of his theory by Edward C. Jeffrey, objects to evolution by selection of fluctuating variation on the ground that this is too slow a process for the length of geologic time.

He does this without offering any evidence that evolution by selection of mutations would be any faster process. He admits that "it is hardly probable that these jumps are numerous in a state of nature as it now surrounds us."

Is there any more presumption in favor of a more rapid rate for evolution proceeding by jumps separated by long intervals from each other than by evolution proceeding by constant though imperceptible steps?

Until we are in possession of such quantitative data we are not in a position to affirm how much change may or may not take place in organisms in a given period of time.

Croll, I think it was, offered a word of caution here. It was to the effect that no one was in a position to say offhand what might or might not take place in a million years.

It has always seemed to me that Herbert Spencer pretty effectually answered the "not-time-enough objection" to evolution, even by the slow process of imperceptible change in organisms; by a comparison of ontogeny with phylogeny and the drawing of a conclusion in accordance with the simple "rule of three."

Taking the development of man in his individual history of 40 weeks from germ cell to fully developed human being, as an epitome of the development of the animal kingdom

from protozoan cell to highest vertebrate in the course of geologic ages, he let 40 weeks (reduced to hours) represent geologic time—say 20 or 40 million years. For the third term in the proportion he took the number of hours it was necessary to observe the embryonic development in order to detect an appreciable change, and obtained for an answer as the fourth term a number in years which was much longer, even when the shortest lengths of geologic time were taken, than our historic period.

So that it was clear there was plenty of geologic time for evolution to proceed at a pace so slow that it could not be detected within the historic period and still accomplish its perfect work.

When it comes to attempts to estimate geologic time in years it seems to me that most persons must agree that they are not very satisfactory. This is particularly so with those of the physicists who have assumed as a basis for their calculations an origin for our planet, no longer looked upon with much favor in the light of the facts which support the planetesimal hypothesis. These calculations have also been largely invalidated by discoveries relating to the radio-activity of matter.

Of all geologic time estimates, those based upon rate of denudation, and its correlative—the rate of deposition of stratified rocks, seem least unsatisfactory. When these methods are applied to precambrian time it is admitted they amount to little more than wild guesses.

And yet we know that evolution was well on its way before the beginning of Cambrian time.

Walcott has brought to light in the Canadian Rockies abundant evidence of a rich and by no means lowly organized marine fauna at the very beginning of Cambrian time.

He and others estimate that at least 90 per cent. of the total evolution to the present had taken place before the Cambrian period.

Le Conte, even before he had had the benefit of these discoveries, was impressed with the high type of the Cambrian faunas.

His memorable words in this connection are:

When the curtain goes up on geological history

at the beginning of the Cambrian Period we find practically all the subkingdoms of the animal kingdom present and ready to answer to the roll call.

In the light of these facts what vistas of practically unrecorded geologic time filled with evolutionary process are opened up to us!

Bold indeed is he who from a rate of development predicated upon that observed during the brief span of the historic period would assert that geologic time is too short for a gradual evolutionary process.

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#### POTASSIUM CYANIDE AS AN INSECTICIDE

READING the article of Professor Fernando Sanford in the October 9 issue, I would add that I have found potassium cyanide very effective in killing ants in lawns, and it does its work without killing the grass. A half ounce in 6 to 8 quarts of water applied with a sprinkling pot is enough for a nest 18 or 20 inches across.

W. G. BLISH

#### SCIENTIFIC BOOKS

*Dialogues concerning Two New Sciences.* By GALILEO GALILEI. Translated from the Italian and Latin into English by HENRY CREW and ALFONSO DE SALVIO, of Northwestern University, with an introduction by ANTONIO FAVARO, of the University of Padua. New York, The Macmillan Company. 1914. Pp. xxi + 300. Price \$2.00 net.

In these dialogues Galileo presents the results of his investigations in mechanics and physics. His representative, Salviati, speaking either for himself or as the reader and expositor of the manuscript of a certain unnamed academician—of course Galileo once again—is the principal speaker, and the source of most of the valuable original ideas. Sagredo, the more learned of the other two interlocutors, occasionally contributes something of importance. Simplicio, as an interested layman, raises the objections which would occur to such a man, and gives occasion for the introduction of alternative ex-